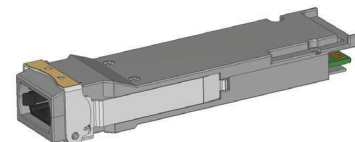




LTA8514-BC+ QSFP+ SR4 Transceiver

4 x 3.125Gb/s 850nm Transceiver

The LTA8514 is a QSFP+ Optical transceiver for 4 x 3.125Gb/s optical links. It is compliant with the QSFP+ MSA.



Applications

- InfiniBand SDR applications
- GbE applications
- 2xGbE applications
- High performance computing interconnect

Features

- 4 independent parallel optical channels
- Each channel data rate up to 3.125Gb/s
- Hot Pluggable QSFP+ form factor
- Up to 200m link on OM2 MMF
- 850nm VCSEL/PD Array Technology
- CML Compatible electrical I/O
- Maximum power consumption <1.5W

- QSFP+ MSA Compliance
- Optical connectivity via industry standard MPO/MTP terminated fiber ribbon
- Monitors for VCSEL bias, module temperature, and module supply
- supply voltage are implemented
- Case Operating Temperature:
 - Commercial: 0 to 70°C
- RoHS II Compliance

Recommended Operating Conditions						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Case Operating Temperature	T_{case}	0	+25	+70	°C	Temperature Range = C
Module Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Module Supply Current	I_{IN}	-	-	350	mA	
Signaling Speed Per Channel	S	-	3.125	-	Gb/s	
Power supply noise	V_{NPS}			50	mVp-p	

Ordering Information	
Part Number	Case Operating Temperature
LTA8514-BC+	0 to 70 °C



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Absolute Maximum Ratings						
Parameter	Symbol	Min	Max	Units	Notes	
Storage Ambient Temperature	T _{stg}	-40	+85	°C	Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device. The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.	
Relative Humidity - Storage	RH _S	0	95	%		
Relative Humidity - Operating	RH _O	0	85	%		
Module Supply Voltage	V _{CC}	-0.5	3.6	V		
Damage Input Optical Power	P _{IN(MAX)}	-	3.4	dBm		
ESD resistance ¹	V _{ESD}		± 1000	V		
Differential input voltage amplitude	ΔV	200	1600	mV		
Voltage on any pin	V _{PIN}	-0.3	V _{CC} + 0.3	V	1.high speed signal pin 1000V based on HBM, EXT pins 2000V	

Transmitter Electrical Interfaces						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Tx_Data Differential Input Voltage	V _{IN}	200	-	1600	mV	
Tx_Data Differential Input Impedance	Z _{IN}	-	100	-	Ω	
Electrical input rise/fall time (20 - 80%)				150	ps	

Receiver Electrical Interfaces						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Rx_Data Differential Output Voltage	V _{OUT}	400		800	mV	
Rx_Data Differential Output Impedance	Z _{OUT}	90	100	110	Ω	
Rx output Data Rising Time (20% to 80%)	Tr	-	-	120	ps	
Rx output Data Falling Time (20% to 80%)	Tf	-	-	120	ps	
Channel to channel skew	t _{sk}			100	ps	
Module Power dissipation	P _D			1.5	W	



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Transmitter Optical Characteristics						
Parameter	Symbol	LTA8514			Units	Notes
		Min	Typ	Max		
Average Launch Power ,each lane	P_{OUT}	-7.6	-	-1	dBm	Average Optical Output
Optical Output with Tx OFF	P_{OFF}	-	-	-30	dBm	
Center Wavelength	λ	840	850	860	nm	
RMS Spectral Width	$\Delta\lambda$	-	-	0.85	nm	
Extinction Ratio	ER	3.5	-	-	dB	
Optical Rise and Fall Time	t_r, t_f	-	-	120	ps	20% - 80%
Optical modulation Amplitude , each lane	OMA	0.190	-		mW	
Difference in launch power between any two lane	Δ_{OMA}	-	-	4	dB	
Optical return loss tolerance	ORL	-	-	12	dB	
Relative intensity noise OMA	RIN_{12OMA}			-120	dB/Hz	
Channel to channel skew	t_{SK}			100	ps	
Transmitter eye mask definition		Compliant to standard				

Receiver Optical Characteristics						
Parameter	Symbol	LTA8514			Units	Notes
		Min	Typ	Max		
Receiver sensitivity	P_{IN}		-13		dBm	Note1
Receiver sensitivity (OMA)	S_{OMA}	48			uW	Note1
Overload (average optical input power)	PIN			-2	dBm	
Center Wavelength	λ	840	850	860	nm	
Receiver Reflectance	RFL	-	-	-12	dB	
Total link jitter contribution	TJ_L			100	ps	
Deterministic link jitter contribution	DJ_L			60	ps	
Rx Signal Detect- Assert	P_A	-	-	-15	dBm	
Rx Signal Detect- Deassert	P_D	-31	-	-	dBm	
Rx Signal Detect- Hysteresis	P_{Hy}	0.5	-	-	dBm	

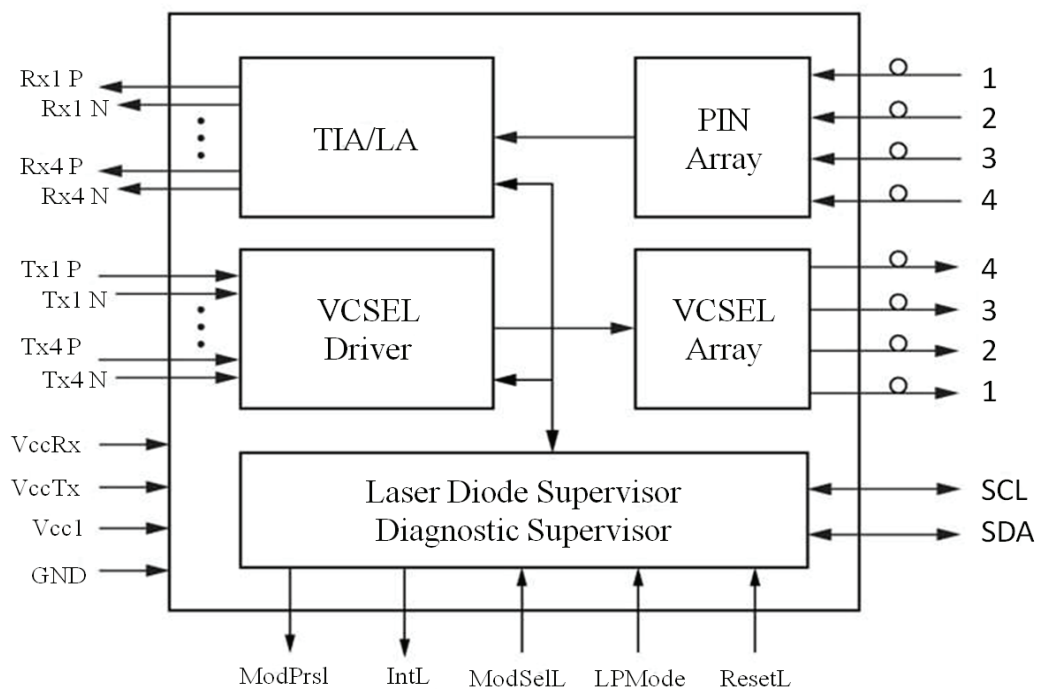
Note 1: where the BER = 10^{-12} , measured with a PRBS 2^7-1 test pattern@3.125Gb/s



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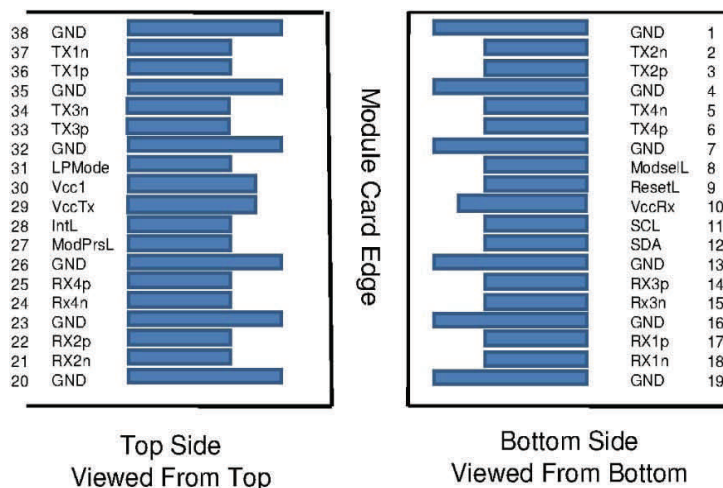
LTA8514 Block Diagram



LTA8514-BC+ QSFP+ SR4 Transceiver

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Pin Assignment



Pin Description			
Pin	Symbol	Description	Notes
1	GND	Ground	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non Inverted Data Input	
4	GND	Ground	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non Inverted Data Input	
7	GND	Ground	
8	ModseL	Module Select	
9	RetsetL	Module Reset	
10	V _{CC} Rx	Receiver +3.3V DC Power Supply	
11	SCL	I ² C Serial Clock	
12	SDA	I ² C Serial Data	
13	GND	Ground	
14	Rx3p	Receiver Non Inverted Differential Output	
15	Rx3n	Receiver Inverted Differential Output	
16	GND	Ground	
17	Rx1p	Receiver Non Inverted Differential Output	
18	Rx1n	Receiver Inverted Differential Output	
19	GND	Ground	
20	GND	Ground	
21	Rx2n	Receiver Inverted Differential Output	
22	Rx2p	Receiver Non Inverted Differential Output	
23	GND	Ground	



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24	Rx4n	Receiver Inverted Differential Output	
25	Rx4p	Receiver Non Inverted Differential Output	
26	GND	Ground	
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	V _{CC} Tx	Transmitter +3.3V DC Power Supply	
30	V _{CC1}	+3.3V DC Power Supply	
31	LPMoD	Low Power Mode	
32	GND	Ground	
33	Tx3p	Transmitter Non Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	
36	Tx1p	Transmitter Non Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	

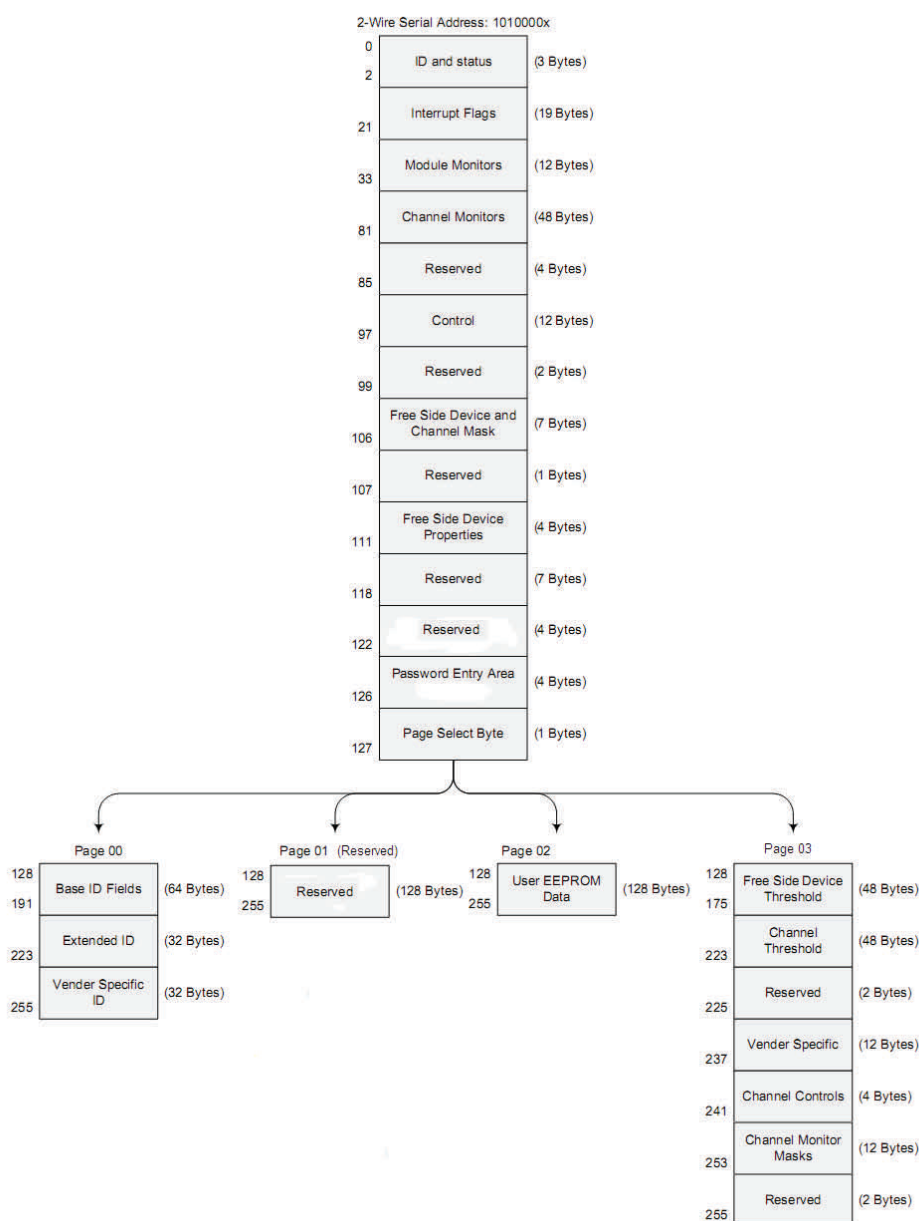


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QSFP Monitoring Interface

Monitoring is available on the QSFP+ transceiver modules. A 2-wire serial interface provides user to contact with module. The module provide per channel transmitted laser bias current monitoring, supply voltage and temperature monitoring. The memory is structured as a single address, multiple page approach. The address is given as A0h. The structure of the memory is shown in followed figure. The memory space is arranged into a lower, single page, address space of 128 bytes and multiple upper address space pages of 128 bytes each. This structure permits timely access to addresses in the lower page, e.g. Interrupt Flags and Monitors. Less time critical entries, e.g. serial ID information and threshold settings are available with the Page Select function.





LTA8514-BC+ QSFP+ SR4 Transceiver

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I ² C Memory Map (Upper memory map Page00-Serial ID: Data Fields , Unlisted Fields are Blank / Empty)				
IIC Addr	Size (byte)	Name	Description	Values (HEX)
128	1	Identifier	Identifier Type of serial Module	0D
129	1	Ext. Identifier	Extended Identifier of Serial Module	00
130	1	Connector	Code for connector type	0C
131-138	8	Specification compliance	Code for electronic compatibility or optical compatibility	00,00,00,00,40,40,02,05
139	1	Encoding	Code for serial encoding algorithm	01
140	1	BR, nominal	Nominal bit rate, units of 100 Mbps	20
141	1	Extended rateselect	Tags for extended rate select compliance	00
142	1	Length(SMF)	Link length supported for SMF fiber in km (note 1)	00
143	1	Length(OM3 50 um)	Link length supported for EBW 50/125 um fiber (OM3), units of 2m (note 1)	00
144	1	Length(OM2 50 um)	Link length supported for 50/125 um fiber (OM2), units of 1m (note 1)	C8
145	1	Length(OM1 62.5 um)	Link length supported for 62.5/125 um fiber (OM1), units of 1m (note 1)	00
146	1	Length (Copper/AOC)	Link length of copper or active cable, units of 1 m	00
147	1	Device tech	Device technology	00
148-163	16	Vendor name	QSFP+ vendor name	ASCII Format
164	1	Extended Module	Extended Module codes for Module	00
165-167	3	Vendor OUI	QSFP+ vendor IEEE company ID	AC 4A FE
168-183	16	Vendor PN	Part number provided by QSFP+ vendor	ASCII Format
184-185	2	Vendor rev	Revision level for part number provided by vendor	ASCII Format
186-187	2	Wave length	Nominal laser wavelength (wavelength=value/20 in nm)	42 68
188-189	2	Wavelength tolerance	Guaranteed range of laser wavelength(+/-value) from nominal wavelength. (wavelength Tol.=value/200 in nm)	07 D0
190	1	Max case temp.	Maximum case temperature in degrees C	00
191	1	CC_BASE	Check code for base ID fields (addresses 128-190)	
192-195	4	Options	Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, VCC, RX power, TX Bias	00 00 04 98
196-211	16	Vendor SN	Serial number provided by vendor	Programmed by Factory
212-219	8	Date Code	Vendor's manufacturing date code	Programmed by Factory
220	1	Monitoring Type	Indicates which types of monitoring are implemented (if any) in the Module. Bit 1,0 Reserved	08
221	1	Enhanced Options	Indicates which optional enhanced features are implemented in the Module.	00
222	1	Reserved		
223	1	CC_EXT	Check code for the Extended ID Fields (addresses 192-222)	
224-255	32	Vendor Specific EEPROM		

Note 1: A value of zero means that the Module does not support the specified technology or that the length information must be determined from the Module technology.



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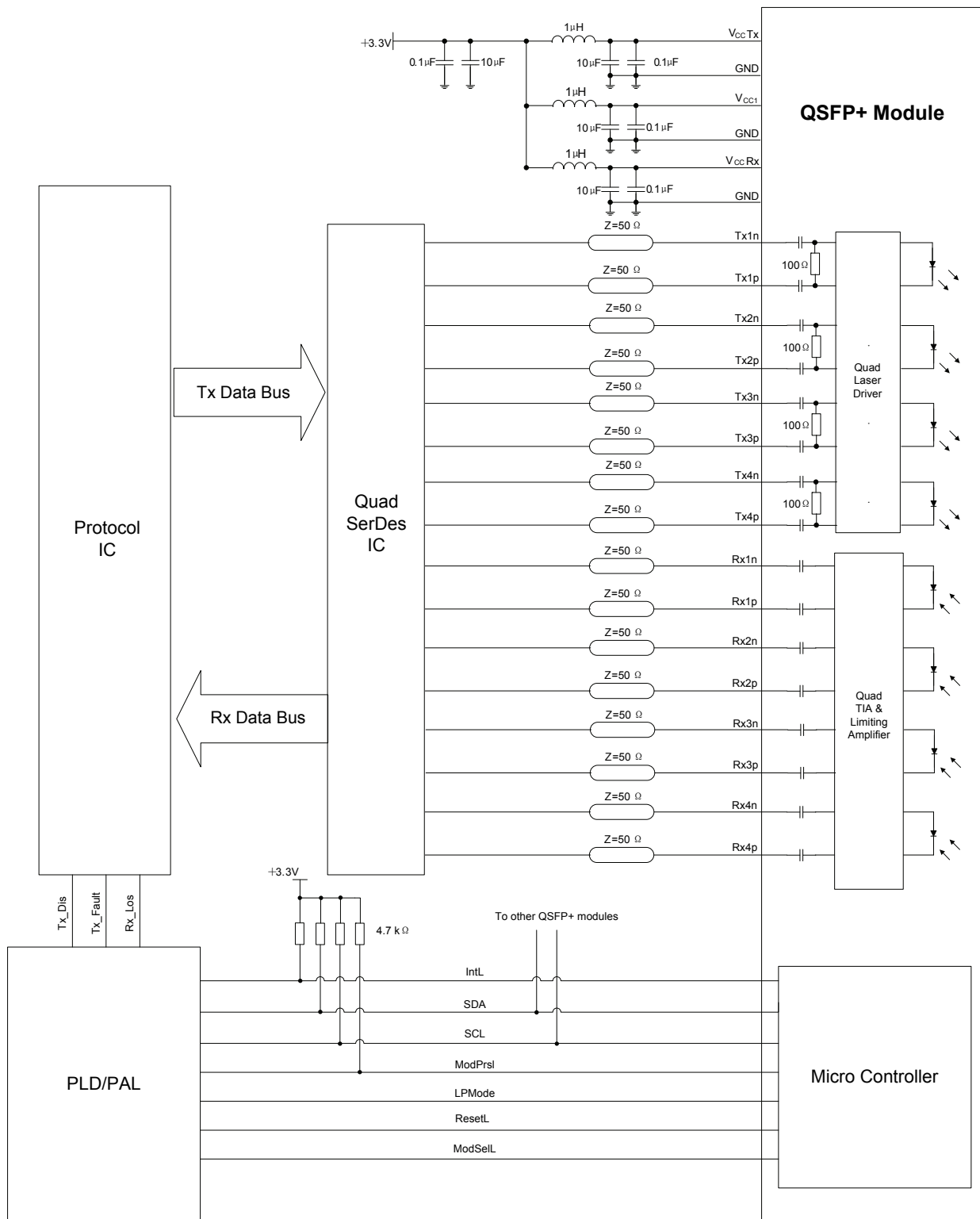
I ² C Memory Map (Module and Channel Thresholds (Page 03))				
IIC Addr	Byte	Name	Description	Values
128-129	2	Case temp High Alarm (°C)	MSB at low address	80
130-131	2	Case temp Low Alarm (°C)	MSB at low address	-10
132-133	2	Case temp High Warning (°C)	MSB at low address	75
134-135	2	Case temp Low Warning (°C)	MSB at low address	-5
136-143	8	Reserved	MSB at low address	
144-145	2	Vcc High Alarm (V)	MSB at low address	3.6
146-147	2	Vcc Low Alarm (V)	MSB at low address	3.0
148-149	2	Vcc High Warning (V)	MSB at low address	3.5
150-151	2	Vcc Low Warning (V)	MSB at low address	3.1
152-159	8	Reserved		
160-175	16	Reserved		
176-177	2	Rx power high alarm	MSB at low address	3.4
178-179	2	Rx power low alarm	MSB at low address	-14
180-181	2	Rx power high warning	MSB at low address	2.4
182-183	2	Rx power low warning	MSB at low address	-13
184-185	2	Tx Bias High Alarm (mA)	MSB at low address	12
186-187	2	Tx Bias Low Alarm (mA)	MSB at low address	0
188-189	2	Tx Bias High Warning (mA)	MSB at low address	10
190-191	2	Tx Bias Low Warning (mA)	MSB at low address	0
192-199	8	Reserved		
200-207	8	Reserved		
208-223	16	Reserved		



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Electrical Interface

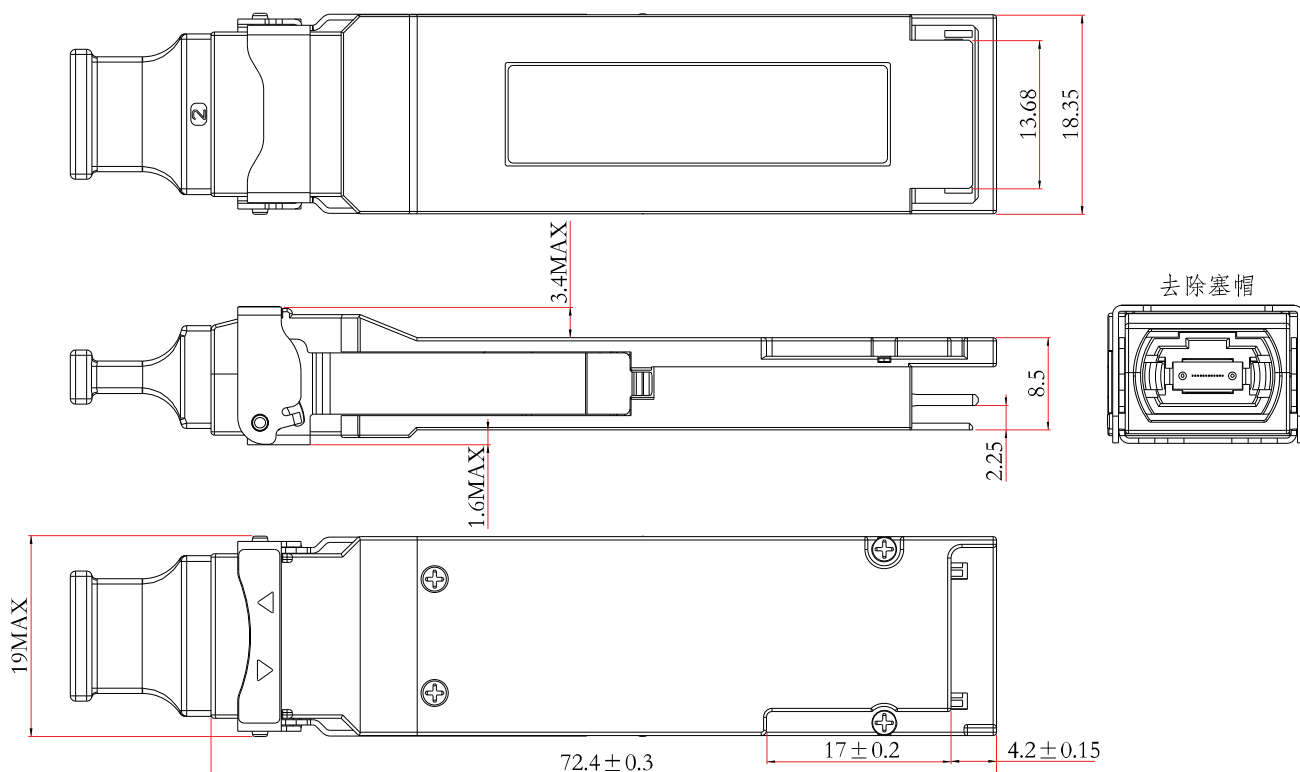




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Mechanical Dimensions



NOTES:
 1. Dimensions are mm;
 2. Tolerance: ± 0.1mm;

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EYE SAFETY

The transceiver is a Class 1 eye-safe device according to FDA 21CFR1040.10 and 1040.11, IEC 60825-1 and IEC 60825-2.

ELECTROMAGNETIC INTERFERENCE (EMI), IMMUNITY AND PRODUCT SAFETY

The transceiver is ESD safe (electrical pins) when tested according to MIL-STD-883, Method 3015.4 and ESD safe (optical connector) when tested according to IEC 61000-4-2. The device is immune to strong RF fields when tested in accordance with IEC 61000-3. The device complies with (US) FCC, Part 15, Subpart J; (Europe) CENELEC EN 55022; (Canada) Class B (CISPR22A); and (Japan) VCCI Class 1. The device has been designed to conform to product safety requirements including UL1950, CSA 22.2, and IEC 60950, and has been designed to meet the flammability requirements of UL94.

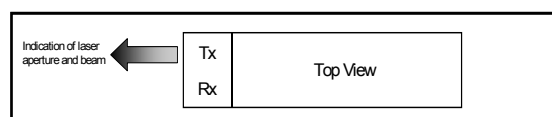
NOTICE

The factory has made all adjustments to this device prior to shipment. No adjustments or modifications to the device are required or permitted. Any adjustment, modification or tampering of the device voids the product warranty. The US Food and Drug Administration may consider that any adjustment or modification to this device is an act of manufacturing and therefore will require that the device be recertified in accordance with 21 CFR 1040.10 .

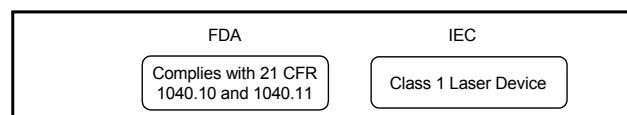
REQUIRED LABEL AND LASER EMISSION

This device is labeled in accordance with FDA and IEC requirements for laser safety.

REQUIRED LABEL



LASER EMISSION



LASER RADIATION INFORMATION

Wavelength	850nm
FDA Total Pout: 7mm aperture at 20 cm distance	< 195 μ watts
IEC Total Pout : 7mm aperture at 10 cm distance	< 15,600 μ watts
Beam Divergence	17.25°



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